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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/798,062	03/11/2004	Dan-Hui Dorothy Yang	10030934-1	5691

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EXAMINER	
KAPUSHOC, STEPHEN THOMAS	
ART UNIT	PAPER NUMBER
1634	

SHORTENED STATUTORY PERIOD OF RESPONSE	MAIL DATE	DELIVERY MODE
3 MONTHS	02/27/2007	PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

If NO period for reply is specified above, the maximum statutory period will apply and will expire 6 MONTHS from the mailing date of this communication.

Office Action Summary	Application No.	Applicant(s)	
	10/798,062	YANG ET AL.	
	Examiner	Art Unit	
	Stephen Kapushoc	1634	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *08 November 0206*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-27* is/are pending in the application.

4a) Of the above claim(s) *1, 2, and 5-11* is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *3,4 and 12-27* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

Claims 1-27 are pending.
Claims 1, 2, and 5-11 are withdrawn.
Claims 3, 4, and 12-27 are examined on the merits.

This Office Action is in reply to Applicants' correspondence of 11/08/2006. No claim(s) is/are cancelled; claim(s) 1, 2, and 5-11 is/are withdrawn; claim(s) 12-27 has/have been newly added; claim(s) 3 and 4 has/have been amended.

Applicants' remarks and amendments have been fully and carefully considered but are not found to be persuasive. Any new grounds of rejection presented in this Office Action are necessitated by Applicants' amendments. Any rejections or objections not reiterated herein have been withdrawn in light of the amendments to the claims or as discussed in this Office Action.

This Action is made **FINAL**.

Election/Restrictions

1. Applicant has affirmed the election of the invention of Group II. Applicant has traversed the requirement for restriction on the ground(s) that a search of the different inventions of a method for polymer detection (Group I) and an apparatus comprising a nanopore in a substrate (Group II) would not be burdensome.. This is not found persuasive because the different classification of the different inventions is prima facie evidence of a burdensome search of the different inventions.

The requirement is still deemed proper and is therefore made FINAL.

New Grounds of Rejection
Claim Rejections - 35 USC § 112 2nd¶

2. The following is a quotation of the second paragraph of 35 U.S.C. 112:

> The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

3. Claim 22 is rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

4. Claim 22 is unclear over recitation of the phrase 'said first and second electrodes', because there is no antecedent basis for any 'first and second electrodes' in either claim 22, or claim 3 (from which claim 22 depends) which recites only 'at least two electrodes. It is suggested that the claim be amended to provided proper antecedent basis for the phrase.

New Grounds of Rejection
Claim Rejections - 35 USC § 102

5. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (a) the invention was known or used by others in this country, or patented or described in a printed publication in this or a foreign country, before the invention thereof by the applicant for a patent.
>
> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.
>
> (e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

6. Claims 3, 4, 12-16, 18-25 and 27 are rejected under 35 U.S.C. 102(b) as being anticipated by Branton et al (2000) Publication WO 00/079257 A1.

Branton et al teaches methods and an apparatus for the evaluation of biopolymers. The reference teaches an apparatus comprising nanopores (termed in the reference as nanoscale apertures of holes) in a substrate.

Regarding claim 3, the reference teaches a substrate having a nanopore and at least two electrodes positioned to apply a voltage across the nanopore (e.g. Fig 5A and 5B). The reference further teaches DNA, which is a conductive biopolymer, traversing the pore, thus the conductive biopolymer is positioned in the pore (e.g.: Fig 8B; p.12 ln.31-p.13 ln.1).

Regarding claim 4, the reference specifically teaches double stranded DNA (p.11 lns.10-11; p.13 ln.17).

Regarding claim 12, it is noted that the limitation that the 'nanopore is designed to translocate a biopolymer' appears to be a recitation of the intended use of the claimed apparatus, and does not server to further limit the structure of the claimed apparatus. However, the reference teaches that a biopolymer is translocated through the nanopore (e.g.: p.27 ln.24).

Regarding claims 13 and 14, the reference teaches nanopore structures with diameters in the range of about 1-2nm (p.6 ln.23) and about 2-20nm (p.13 ln.25).

Regarding claim 15, the reference teaches a nanopore formed by ion beam sputtering, and etching (e.g.: p.20 ln.1; p.22 ln.20).

Regarding claim 16, the reference teaches that the nanopore passes through the substrate (e.g.: Fig 5A).

Regarding claim 18, the reference teaches an apparatus which comprises connection of electrodes to a measuring device, which inherently comprises a wire (e.g.: p.24 lns.9-15; p.7 lns.10-11; fig 16A; p.41 ln.28).

Regarding claim 19, the reference teaches a nanopore substrate that is silica (p.13 ln.9).

Regarding claim 20, the reference teaches that the substrate comprising the nanopore may be a composite of various materials in a sandwich configuration, which is more than one layer (p.4 ln.26; Fig 5A).

Regarding claims 21-25, the reference teaches (Fig 5A) and an apparatus comprising two electrodes where the pore of the substrate passes through the electrodes (claim 21), and the electrodes encircle each end of the pore, thus the pore is defined by the space between the electrodes (claim 22). The reference teaches two circular electrodes (claim 23 and claim 24) on both sides (e.g. p.5 ln.22) of a substrate (claim 25).

Regarding claim 27, the reference teaches an apparatus with electrodes deposited on the surface of a substrate (e.g. p.5 ln.22; p.24 lns.19-21).

7. Claims 3, 4, 12-16, 18-20 and 25 are rejected under 35 U.S.C. 102(a) and (e) as being anticipated by Su, Pub No.: US 2003/0232346 A1 (published 12/18/2003, filed 6/17/2002).

The rejection of claims is made under 102(a) based on the publication date of the applied reference (the publication date is 12/18/2003) and under 102(e) based on the filing date of the applied reference (6/17/2002).

Regarding claims 3, the reference teaches a substrate having a nanopore and two electrodes positioned to apply voltage across the nanopore (p.5 ¶0054; p.7-electrical detectors), and teaches passage of a conductive biopolymer through the pore, thus positioned in the nanopore (p70 ¶0070).

Regarding claim 4, the reference teaches dsDNA (p70 ¶0070 and definition of 'nucleic acid' p.3 ¶0027).

Regarding claim 12, the reference teaches that a biopolymer goes through the pore (e.g. p70 ¶0070).

Regarding claims 13 and 14, the reference teaches pores with a diameter of 2.6nm (p.6 ¶0055).

Regarding claim 15, the reference teaches that a pore made be made by etching (p.6 ¶0056).

Regarding claim 16, the reference teaches a pore that passes through a substrate (see for example Fig 1).

Regarding claim 18, the reference teaches an apparatus which comprises connection to an electrical detector, which inherently comprises a wire (e.g.: p.7 – electrical detectors; Fig 1).

Regarding claim 19, the reference teaches an apparatus comprising a nanopore in a silicon substrate (p.6 ¶0056).

Regarding claim 20, the reference teaches a pore in a lipid bilayer, which is more than one layer (p.5 ¶0054).

Regarding claim 25, the reference teaches electrodes on either side of a pore (Fig 1; p.7 ¶0070).

New Grounds of Rejection
Claim Rejections - 35 USC § 103

8. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

9. Claim 17 is rejected under 35 U.S.C. 103(a) as being unpatentable over Branton et al (2000) Publication WO 00/079257 A1 in view of Smyczek et al (1990) (U.S. Patent No. 4,908,319).

Branton et al teaches an apparatus for the evaluation of biopolymers. The reference teaches a substrate having a nanopore and at least two electrodes positioned to apply a voltage across the nanopore (e.g. Fig 5A and 5B). The reference further teaches DNA, which is a conductive biopolymer, traversing the pore, thus the conductive biopolymer is positioned in the pore (e.g.: Fig 8B; p.12 ln.31-p.13 ln.1). Thus the reference teaches all of the limitations of claim 3, from which claim 17 depends.

Branton et al does not teach a substrate that comprises a mesh layer.

Smyczek et al teaches an apparatus wherein one of the layers is a nylon mesh (column 4, lines 29-40) with the added advantage that interaction between the liquid and solid phases is facilitated by the mesh filter (column 4, lines 29-40).

It would have been prima facie obvious to one of ordinary skill in the art at the time the invention was made to have created the substrate of Branton et al with incorporation of a mesh layer as taught by Smyczek et al. One would have been motivated to create a substrate comprising a mesh layer based on the teachings of Smyczek et al that such a layer facilitates interaction between liquids and solids, and further based on the teachings of Branton et al that wetting of the substrate is important to minimize the formation of bubbles (p.19 ln.15-18).

10. Claim 26 is rejected under 35 U.S.C. 103(a) as being unpatentable over Branton et al (2000) Publication WO 00/079257 A1 in view of Sohn et al (2002) (U.S. Patent publication 2002/0140414 A1).

Branton et al teaches an apparatus for the evaluation of biopolymers. The reference teaches a substrate having a nanopore and at least two electrodes positioned to apply a voltage across the nanopore (e.g. Fig 5A and 5B). The reference further teaches DNA, which is a conductive biopolymer, traversing the pore, thus the conductive biopolymer is positioned in the pore (e.g.: Fig 8B; p.12 ln.31-p.13 ln.1). Thus the reference teaches all of the limitations of claim 3, from which claim 17 depends.

Branton et al does not teach electrodes comprising a material recited in claim 26.

Sohn et al teaches methods and apparatus for the analysis of particles, including structures which comprise electrodes comprised of copper (p.4 ¶0063)

It would have been prima facie obvious to one of ordinary skill in the art at the time the invention was made to have created the substrate of Branton et al and included electrodes comprising copper. One would have been motivated to create electrodes made of copper based on the teachings of Sohn et al that such electrodes can be used in an apparatus to analyze substances including nucleic acids (fig 10; p.7 ¶0096), and further based on the teachings of Branton et al that a variety of conductive metals may be used as electrodes (p.24 lns.20-21) for the analysis of DNA.

New grounds of Rejection
Double Patenting

11. The nonstatutory double patenting rejection is based on a judicially created doctrine grounded in public policy (a policy reflected in the statute) so as to prevent the unjustified or improper timewise extension of the "right to exclude" granted by a patent and to prevent possible harassment by multiple assignees. A nonstatutory obviousness-type double patenting rejection is appropriate where the conflicting claims are not identical, but at least one examined application claim is not patentably distinct from the reference claim(s) because the examined application claim is either anticipated by, or would have been obvious over, the reference claim(s). See, e.g., *In re Berg*, 140 F.3d 1428, 46 USPQ2d 1226 (Fed. Cir. 1998); *In re Goodman*, 11 F.3d 1046, 29 USPQ2d 2010 (Fed. Cir. 1993); *In re Longi*, 759 F.2d 887, 225 USPQ 645 (Fed. Cir. 1985); *In re Van Ornum*, 686 F.2d 937, 214 USPQ 761 (CCPA 1982); *In re Vogel*, 422 F.2d 438, 164 USPQ 619 (CCPA 1970); and *In re Thorington*, 418 F.2d 528, 163 USPQ 644 (CCPA 1969).

A timely filed terminal disclaimer in compliance with 37 CFR 1.321(c) or 1.321(d) may be used to overcome an actual or provisional rejection based on a nonstatutory double patenting ground provided the conflicting application or patent either is shown to be commonly owned with this application, or claims an invention made as a result of activities undertaken within the scope of a joint research agreement.

Effective January 1, 1994, a registered attorney or agent of record may sign a terminal disclaimer. A terminal disclaimer signed by the assignee must fully comply with 37 CFR 3.73(b).

12. Claims 3, 4, 12-16, 18-25, and 27 are provisionally rejected on the ground of nonstatutory obviousness-type double patenting as being unpatentable over claims 1-8, 13-20, and 25-27 of copending Application No. 10/352,675 in view of Branton et al (2000) Publication WO 00/079257 A1.

This is a provisional obviousness-type double patenting rejection because the conflicting claims have not in fact been patented.

The claims of the conflicting application are drawn to structures for detecting a biopolymer comprising nanopores and electrodes.

The structures claimed by the conflicting application do not require all of the limitations of the structures claimed by the instant application, however such deficiencies were known in the art at the time of the invention, and were taught by Branton et al, as discussed below.

Regarding claim 3, the reference teaches a substrate having a nanopore and at least two electrodes positioned to apply a voltage across the nanopore (e.g. Fig 5A and 5B). The reference further teaches DNA, which is a conductive biopolymer, traversing the pore, thus the conductive biopolymer is positioned in the pore (e.g.: Fig 8B; p.12 ln.31-p.13 ln.1).

Regarding claim 4, the reference specifically teaches double stranded DNA (p.11 lns.10-11; p.13 ln.17).

Regarding claim 12, it is noted that the limitation that the 'nanopore is designed to translocate a biopolymer' appears to be a recitation of the intended use of the claimed apparatus, and does not server to further limit the structure of the claimed apparatus. However, the reference teaches that a biopolymer is translocated through the nanopore (e.g.: p.27 ln.24).

Regarding claims 13 and 14, the reference teaches nanopore structures with diameters in the range of about 1-2nm (p.6 ln.23) and about 2-20nm (p.13 ln.25).

Regarding claim 15, the reference teaches a nanopore formed by ion beam sputtering, and etching (e.g.: p.20 ln.1; p.22 ln.20).

Regarding claim 16, the reference teaches that the nanopore passes through the substrate (e.g.: Fig 5A).

Regarding claim 18, the reference teaches an apparatus which comprises connection of electrodes to a measuring device, which inherently comprises a wire (e.g.: p.24 lns.9-15; p.7 lns.10-11; fig 16A; p.41 ln.28).

Regarding claim 19, the reference teaches a nanopore substrate that is silica (p.13 ln.9).

Regarding claim 20, the reference teaches that the substrate comprising the nanopore may be a composite of various materials in a sandwich configuration, which is more than one layer (p.4 ln.26; Fig 5A).

Regarding claims 21-25, the reference teaches (Fig 5A) and an apparatus comprising two electrodes where the pore of the substrate passes through the electrodes (claim 21), and the electrodes encircle each end of the pore, thus the pore is defined by the space between the electrodes (claim 22). The reference teaches two circular electrodes (claim 23 and claim 24) on both sides (e.g. p.5 ln.22) of a substrate (claim 25).

Regarding claim 27, the reference teaches an apparatus with electrodes deposited on the surface of a substrate (e.g. p.5 ln.22; p.24 lns.19-21).

It would have been prima facie obvious to one of ordinary skill in the art at the time the invention was made to have included the structural limitations of the instantly claimed invention in the structure claimed in the conflicting application. One would have been motivated to do so based on the teachings of Barton et al that such structures are suitable for the analysis of biopolymers, such as DNA.

Claims 3, 4, 12-16, 18-25, and 27 are provisionally rejected on the ground of nonstatutory obviousness-type double patenting as being unpatentable over claims 1-20 and 30-53 of copending Application No. 10/821,239 in view of Branton et al (2000) Publication WO 00/079257 A1.

This is a provisional obviousness-type double patenting rejection because the conflicting claims have not in fact been patented.

The claims of the conflicting application are drawn to structures for detecting a chemical moeity comprising nanopores and electrodes.

The structures claimed by the conflicting application do not require all of the limitations of the structures claimed by the instant application, however such deficiencies were known in the art at the time of the invention, and were taught by Branton et al, as discussed below.

Regarding claim 3, the reference teaches a substrate having a nanopore and at least two electrodes positioned to apply a voltage across the nanopore (e.g. Fig 5A and 5B). The reference further teaches DNA, which is a conductive biopolymer, traversing the pore, thus the conductive biopolymer is positioned in the pore (e.g.: Fig 8B; p.12 ln.31-p.13 ln.1).

Regarding claim 4, the reference specifically teaches double stranded DNA (p.11 lns.10-11; p.13 ln.17).

Regarding claim 12, it is noted that the limitation that the 'nanopore is designed to translocate a biopolymer' appears to be a recitation of the intended use of the claimed apparatus, and does not server to further limit the structure of the claimed apparatus. However, the reference teaches that a biopolymer is translocated through the nanopore (e.g.: p.27 ln.24).

Regarding claims 13 and 14, the reference teaches nanopore structures with diameters in the range of about 1-2nm (p.6 ln.23) and about 2-20nm (p.13 ln.25).

Regarding claim 15, the reference teaches a nanopore formed by ion beam sputtering, and etching (e.g.: p.20 ln.1; p.22 ln.20).

Regarding claim 16, the reference teaches that the nanopore passes through the substrate (e.g.: Fig 5A).

Regarding claim 18, the reference teaches an apparatus which comprises connection of electrodes to a measuring device, which inherently comprises a wire (e.g.: p.24 lns.9-15; p.7 lns.10-11; fig 16A; p.41 ln.28).

Regarding claim 19, the reference teaches a nanopore substrate that is silica (p.13 ln.9).

Regarding claim 20, the reference teaches that the substrate comprising the nanopore may be a composite of various materials in a sandwich configuration, which is more than one layer (p.4 ln.26; Fig 5A).

Regarding claim 21-25, the reference teaches (Fig 5A) and an apparatus comprising two electrodes where the pore of the substrate passes through the electrodes (claim 21), and the electrodes encircle each end of the pore, thus the pore is defined by the space between the electrodes (claim 22). The reference teaches two circular electrodes (claim 23 and claim 24) on both sides (e.g. p.5 ln.22) of a substrate (claim 25).

Regarding claim 27, the reference teaches an apparatus with electrodes deposited on the surface of a substrate (e.g. p.5 ln.22; p.24 lns.19-21).

It would have been prima facie obvious to one of ordinary skill in the art at the time the invention was made to have included the structural limitations of the instantly claimed invention in the structure claimed in the conflicting application. One would have been motivated to do so based on the teachings of Barton et al that such structures are suitable for the analysis of biopolymers, such as DNA.

Claims 3, 4, 12-16, 18-25, and 27 are provisionally rejected on the ground of nonstatutory obviousness-type double patenting as being unpatentable over claims 1-8 and 13-19 of copending Application No. 10/957,378 in view of Branton et al (2000) Publication WO 00/079257 A1.

This is a provisional obviousness-type double patenting rejection because the conflicting claims have not in fact been patented.

The claims of the conflicting application are drawn to structures for detecting a chemical moiety comprising nanopores and electrodes.

The structures claimed by the conflicting application do not require all of the limitations of the structures claimed by the instant application, however such deficiencies were known in the art at the time of the invention, and were taught by Branton et al, as discussed below.

Regarding claim 3, the reference teaches a substrate having a nanopore and at least two electrodes positioned to apply a voltage across the nanopore (e.g. Fig 5A and 5B). The reference further teaches DNA, which is a conductive biopolymer, traversing the pore, thus the conductive biopolymer is positioned in the pore (e.g.: Fig 8B; p.12 ln.31-p.13 ln.1).

Regarding claim 4, the reference specifically teaches double stranded DNA (p.11 lns.10-11; p.13 ln.17).

Regarding claim 12, it is noted that the limitation that the 'nanopore is designed to translocate a biopolymer' appears to be a recitation of the intended use of the claimed apparatus, and does not server to further limit the structure of the claimed apparatus. However, the reference teaches that a biopolymer is translocated through the nanopore (e.g.: p.27 ln.24).

Regarding claims 13 and 14, the reference teaches nanopore structures with diameters in the range of about 1-2nm (p.6 ln.23) and about 2-20nm (p.13 ln.25).

Regarding claim 15, the reference teaches a nanopore formed by ion beam sputtering, and etching (e.g.: p.20 ln.1; p.22 ln.20).

Regarding claim 16, the reference teaches that the nanopore passes through the substrate (e.g.: Fig 5A).

Regarding claim 18, the reference teaches an apparatus which comprises connection of electrodes to a measuring device, which inherently comprises a wire (e.g.: p.24 lns.9-15; p.7 lns.10-11; fig 16A; p.41 ln.28).

Regarding claim 19, the reference teaches a nanopore substrate that is silica (p.13 ln.9).

Regarding claim 20, the reference teaches that the substrate comprising the nanopore may be a composite of various materials in a sandwich configuration, which is more than one layer (p.4 ln.26; Fig 5A).

Regarding claim 21-25, the reference teaches (Fig 5A) and an apparatus comprising two electrodes where the pore of the substrate passes through the electrodes (claim 21), and the electrodes encircle each end of the pore, thus the pore is defined by the space between the electrodes (claim 22). The reference teaches two

circular electrodes (claim 23 and claim 24) on both sides (e.g. p.5 ln.22) of a substrate (claim 25).

Regarding claim 27, the reference teaches an apparatus with electrodes deposited on the surface of a substrate (e.g. p.5 ln.22; p.24 lns.19-21).

It would have been prima facie obvious to one of ordinary skill in the art at the time the invention was made to have included the structural limitations of the instantly claimed invention in the structure claimed in the conflicting application. One would have been motivated to do so based on the teachings of Barton et al that such structures are suitable for the analysis of biopolymers, such as DNA.

Claims 3, 4, 12-16, 18-25, and 27 are provisionally rejected on the ground of nonstatutory obviousness-type double patenting as being unpatentable over claims 1-8 and 13-19 of copending Application No. 10/996,846 in view of Branton et al (2000) Publication WO 00/079257 A1.

This is a provisional obviousness-type double patenting rejection because the conflicting claims have not in fact been patented.

The claims of the conflicting application are drawn to structures for detecting a biopolymer comprising nanopores and electrodes.

The structures claimed by the conflicting application do not require all of the limitations of the structures claimed by the instant application, however such deficiencies were known in the art at the time of the invention, and were taught by Branton et al, as discussed below.

Regarding claim 3, the reference teaches a substrate having a nanopore and at least two electrodes positioned to apply a voltage across the nanopore (e.g. Fig 5A and 5B). The reference further teaches DNA, which is a conductive biopolymer, traversing the pore, thus the conductive biopolymer is positioned in the pore (e.g.: Fig 8B; p.12 ln.31-p.13 ln.1).

Regarding claim 4, the reference specifically teaches double stranded DNA (p.11 lns.10-11; p.13 ln.17).

Regarding claim 12, it is noted that the limitation that the 'nanopore is designed to translocate a biopolymer' appears to be a recitation of the intended use of the claimed apparatus, and does not server to further limit the structure of the claimed apparatus. However, the reference teaches that a biopolymer is translocated through the nanopore (e.g.: p.27 ln.24).

Regarding claims 13 and 14, the reference teaches nanopore structures with diameters in the range of about 1-2nm (p.6 ln.23) and about 2-20nm (p.13 ln.25).

Regarding claim 15, the reference teaches a nanopore formed by ion beam sputtering, and etching (e.g.: p.20 ln.1; p.22 ln.20).

Regarding claim 16, the reference teaches that the nanopore passes through the substrate (e.g.: Fig 5A).

Regarding claim 18, the reference teaches an apparatus which comprises connection of electrodes to a measuring device, which inherently comprises a wire (e.g.: p.24 lns.9-15; p.7 lns.10-11; fig 16A; p.41 ln.28).

Regarding claim 19, the reference teaches a nanopore substrate that is silica (p.13 ln.9).

Regarding claim 20, the reference teaches that the substrate comprising the nanopore may be a composite of various materials in a sandwich configuration, which is more than one layer (p.4 ln.26; Fig 5A).

Regarding claims 21-25, the reference teaches (Fig 5A) and an apparatus comprising two electrodes where the pore of the substrate passes through the electrodes (claim 21), and the electrodes encircle each end of the pore, thus the pore is defined by the space between the electrodes (claim 22). The reference teaches two circular electrodes (claim 23 and claim 24) on both sides (e.g. p.5 ln.22) of a substrate (claim 25).

Regarding claim 27, the reference teaches an apparatus with electrodes deposited on the surface of a substrate (e.g. p.5 ln.22; p.24 lns.19-21).

It would have been prima facie obvious to one of ordinary skill in the art at the time the invention was made to have included the structural limitations of the instantly claimed invention in the structure claimed in the conflicting application. One would have

been motivated to do so based on the teachings of Barton et al that such structures are suitable for the analysis of biopolymers, such as DNA.

Claims 3, 4, 12-16, 18-25, and 27 are provisionally rejected on the ground of nonstatutory obviousness-type double patenting as being unpatentable over claims 1-15 of copending Application No. 10/898,586 in view of Branton et al (2000) Publication WO 00/079257 A1.

This is a provisional obviousness-type double patenting rejection because the conflicting claims have not in fact been patented.

The claims of the conflicting application are drawn to structures for detecting a biopolymer comprising nanopores and electrodes.

The structures claimed by the conflicting application do not require all of the limitations of the structures claimed by the instant application, however such deficiencies were known in the art at the time of the invention, and were taught by Branton et al, as discussed below.

Regarding claim 3, the reference teaches a substrate having a nanopore and at least two electrodes positioned to apply a voltage across the nanopore (e.g. Fig 5A and 5B). The reference further teaches DNA, which is a conductive biopolymer, traversing the pore, thus the conductive biopolymer is positioned in the pore (e.g.: Fig 8B; p.12 ln.31-p.13 ln.1).

Regarding claim 4, the reference specifically teaches double stranded DNA (p.11 lns.10-11; p.13 ln.17).

Regarding claim 12, it is noted that the limitation that the 'nanopore is designed to translocate a biopolymer' appears to be a recitation of the intended use of the claimed apparatus, and does not server to further limit the structure of the claimed apparatus. However, the reference teaches that a biopolymer is translocated through the nanopore (e.g.: p.27 ln.24).

Regarding claims 13 and 14, the reference teaches nanopore structures with diameters in the range of about 1-2nm (p.6 ln.23) and about 2-20nm (p.13 ln.25).

Regarding claim 15, the reference teaches a nanopore formed by ion beam sputtering, and etching (e.g.: p.20 ln.1; p.22 ln.20).

Regarding claim 16, the reference teaches that the nanopore passes through the substrate (e.g.: Fig 5A).

Regarding claim 18, the reference teaches an apparatus which comprises connection of electrodes to a measuring device, which inherently comprises a wire (e.g.: p.24 lns.9-15; p.7 lns.10-11; fig 16A; p.41 ln.28).

Regarding claim 19, the reference teaches a nanopore substrate that is silica (p.13 ln.9).

Regarding claim 20, the reference teaches that the substrate comprising the nanopore may be a composite of various materials in a sandwich configuration, which is more than one layer (p.4 ln.26; Fig 5A).

Regarding claims 21-25, the reference teaches (Fig 5A) and an apparatus comprising two electrodes where the pore of the substrate passes through the electrodes (claim 21), and the electrodes encircle each end of the pore, thus the pore is defined by the space between the electrodes (claim 22). The reference teaches two circular electrodes (claim 23 and claim 24) on both sides (e.g. p.5 ln.22) of a substrate (claim 25).

Regarding claim 27, the reference teaches an apparatus with electrodes deposited on the surface of a substrate (e.g. p.5 ln.22; p.24 lns.19-21).

It would have been prima facie obvious to one of ordinary skill in the art at the time the invention was made to have included the structural limitations of the instantly claimed invention in the structure claimed in the conflicting application. One would have been motivated to do so based on the teachings of Barton et al that such structures are suitable for the analysis of biopolymers, such as DNA.

Claims 3, 4, 12-16, 18-25, and 27 are provisionally rejected on the ground of nonstatutory obviousness-type double patenting as being unpatentable over claims 1-8 and 13-19 of copending Application No. 10/971,475 in view of Branton et al (2000) Publication WO 00/079257 A1.

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The claims of the conflicting application are drawn to structures for detecting a biopolymer comprising nanopores and electrodes.

The structures claimed by the conflicting application do not require all of the limitations of the structures claimed by the instant application, however such deficiencies were known in the art at the time of the invention, and were taught by Branton et al, as discussed below.

Regarding claim 3, the reference teaches a substrate having a nanopore and at least two electrodes positioned to apply a voltage across the nanopore (e.g. Fig 5A and 5B). The reference further teaches DNA, which is a conductive biopolymer, traversing the pore, thus the conductive biopolymer is positioned in the pore (e.g.: Fig 8B; p.12 ln.31-p.13 ln.1).

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Response to Remarks

Applicants' have noted the provisional nature of the double patenting rejections (Remarks page 5) and declined to address them until the copending claims are finally allowed or rejected.

The rejections as set forth above are **MAINTAINED**.

Conclusion

13. No claim is allowable. No claim is free of the prior art.

Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Stephen Kapushoc whose telephone number is 571-272-3312. The examiner can normally be reached on Monday through Friday, from 8am until 5pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Ram Shukla can be reached at 571-272-0735. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Stephen Kapushoc
Art Unit 1634

BJ FORMAN, PH.D.
PRIMARY EXAMINER